QUALITY CONTROL REPORTS FOR

SEMI DENSE BITUMINOUS CONCRETE

CIVIL-TECH CONSULTANTS AND ENGINEERS

Building & Highway Material Testing Laboratory

An ISO 9001:2008 Certified Company

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Job No.: CTCE/BBMP/HRP/W.No.07/QB(SDBC)/2014-15 28.08.2014

TEST REPORT ON DETERMINATION OF BITUMEN CHARACTERISTICS

CLIENT	:	**Asst. Executive Engineer**, Kodigehalli Sub Division, BBMP, Bangalore.
AGENCY	:	**Mr. H.R. Pratap,** Contractor, Bangalore.
NAME OF THE WORK	:	Improvements to roads in BGS Layout in Ward No.07, Byatarayanapura, BBMP, Bangalore.
REFERENCE	:	EE/BTP/BBMP/E-TEND/84/2014-15 Dated: 25.08.2014
SOURCE OF LOCATION	:	Hot mix Plant, Bangalore
DATE OF TESTING	:	28.08.2014

The results of the tests conducted on the bitumen sample for Semi Dense Bituminous Concrete are as follows:

Sl. No	Description	Test Method as per IS	Test Result	Requirement as per IS:73:2013
1	Penetration at 25 ^{0}C, 1/10 mm	IS :1203 -1978 (RA-2009)	93	80 to 100
2	Softening point, ^{0}C	IS :1205 -1978 (RA-2009)	46	Min. 40
3	Ductility at 27^{0}C, cm	IS :1208 -1978 (RA-2009)	100 >	Min. 75
4	Flash Point, ^{0}C	IS :1209 -1978 (RA-2009)	286	Min. 220

Note:

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28.08.2014

Aggregate Impact Value

IS: 2386 Part IV

Client	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	**Mr. H.R. Pratap,** Contractor, Bangalore.
Name of the Work	Improvements to roads in BGS Layout in Ward No.07, Byatarayanapura, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-TEND/84/2014-15 Dated: 25.08.2014
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	28.08.2014

Sl No.	Details	Trial No.		Average
		1	2	
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	389	387	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	86	84	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	303	303	
4	Aggregate Impact value = percent fines	22.11	21.71	
	100* (W_2/W_1)%			21.91

Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

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Job No.: CTCE/BBMP/HRP/W.No.07/SDBC/Shape_T/2014-15 ; 28.08.2014

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	: **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	: **Mr. H.R. Pratap,** Contractor, Bangalore.
Name of Work	: Improvements to roads in BGS Layout in Ward No.07, Byatarayanapura, BBMP, Bangalore.
Reference	: EE/BTP/BBMP/E-TEND/84/2014-15 Dated: 25.08.2014
Technical Reference	: IS 2386(Part 1) 1963 (RA 2007)
Type of Mix	: Semi Dense Bituminous Concrete
Date of Testing	: 28.08.2014

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Result : Flakiness Index = **12.65%**

Elongation Index = **13.82%**

Result : Combined Flakiness & Elongation index **26.47%**

Comments:

Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

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Job No.: CTCE/BBMP/HRP/W.No.07/SDBC/Stripping/2014-15 29.08.2014

Stripping Value of Road Aggregates (Static Immersion Test)

IS: 6241

Client	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	**Mr. H.R. Pratap,** Contractor, Bangalore.
Name of the work	Improvements to roads in BGS Layout in Ward No.07, Byatarayanapura, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-TEND/84/2014-15 Dated: 25.08.2014
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	29.08.2014

Type of binder : 80/100
Percentage of binder used : 5.0% by wt.
Total weight of aggregate : 200 g
Total weight of binder : 10.0 g
Temperature of water-bath : 40° C

Observation Number	Stripping, Percentage	Average, Percentage	Average Retained Coating, %
1	3.2	3.27	96.73
2	3.5		
3	3.1		

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Comments:

→ Minimum allowable Aggregate retained coating for Semi Dense Bituminous Concrete is 95%

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Job No.: CTCE/BBMP/HRP/W.No.07/SDBC/Sp_Wa/2014-15

29.08.2014

Specific Gravity And Water Absorption Test

IS: 2386 Part III

Client	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	**Mr. H.R. Pratap,** Contractor, Bangalore.
Name of the Work	Improvements to roads in BGS Layout in Ward No.07, Byatarayanapura, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-TEND/84/2014-15 Dated: 25.08.2014
Type of Mix	Semi Dense Bituminous Concrete
Source / Location	Hotmix Plant, Bangalore
Date of Testing	29.08.2014

Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 3	
1	Weight of aggregate suspended in water with the basket	W_1 g	2030	2028	2029	
2	Weight of basket suspended in water	W_2 g	755	755	755	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_s$ g	1275	1273	1274	
4	Weight of saturated surface dry aggregate in air	W_3 g	2024	2025	2022	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_S)$ g	749	752	748	
6	Weight of oven dried aggregate	W_4 g	2012	2011	2013	
7	Specific Gravity	$W_4/(W_3-W_S)$	2.686	2.674	2.691	2.684
8	Apparent Specific gravity	$W_4/(W_4-W_S)$	2.730	2.725	2.724	2.726
9	Water Absorption	$((W_3-W_4)*100)/W_4$	0.60%	0.70%	0.45%	0.58%

Comments:

→ Maximum allowable Aggregate Water absorption value for Semi Dense Bituminous Concrete is 2.0%

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Job No.: CTCE/BBMP/HRP/W.No.07/SDBC/Bit/2014-15 29.08.2014

BITUMEN CONTENT DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

AS per IRC:SP:-1984

CLIENT	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
AGENCY	**Mr. H.R. Pratap,** Contractor, Bangalore.
NAME OF THE WORK	Improvements to roads in BGS Layout in Ward No.07, Byatarayanapura, BBMP, Bangalore.
REFERENCE	EE/BTP/BBMP/E-TEND/84/2014-15 Dated: 25.08.2014
SAMPLE I/D	Roads in BGS Layout Ward No.07
DATE OF TESTING	29.08.2014

BITUMEN CONTENT DETERMINATION

Description	Trail 1	Trail 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	475	474
3. Weight of Asphalt and Mineral matter Extracted, g	-	-
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g		
6. Weight of Bitumen Extracted, g. (corrected)	25	26.00
7. Bitumen content in %	5.00	5.20
8. Average	5.10	

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Job No.: CTCE/BBMP/HRP/W.No.07/SDBC/Bit/2014-15 29.08.2014

BITUMEN CONTENT GRADATION DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

As per IS2386 and IRC:SP:11-1984

CLIENT	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
AGENCY	**Mr. H.R. Pratap,** Contractor, Bangalore.
NAME OF THE WORK	Improvements to roads in BGS Layout in Ward No.07, Byatarayanapura, BBMP, Bangalore.
REFERENCE	EE/BTP/BBMP/E-TEND/84/2014-15 Dated: 25.08.2014
SAMPLE I/D	Roads in BGS Layout Ward No.07
DATE OF TESTING	29.08.2014

GRADATION AFTER EXTRACTION

Sieve Size in mm	Trail 1				Specified Limits as per MORTH specification table 500-15 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
13.2	0	0	0	100	100
9.5	36.23	7.63	7.63	92.37	90-100
4.75	242.5	51.05	58.68	41.32	35-51
2.36	56.58	11.91	70.59	29.41	24-39
1.18	35.22	7.41	78.01	21.99	15-30
0.3	48.63	10.24	88.24	11.76	9-19
0.075	32.15	6.77	95.01	4.99	3-8

Sieve Size in mm	Trail 2				Specified Limits as per MORTH specification table 500-15 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
13.2	0	0	0	100	100
9.5	34.85	7.35	7.35	92.65	90-100
4.75	251.2	53.00	60.35	39.65	35-51
2.36	36.23	7.64	67.99	32.01	24-39
1.18	43.27	9.13	77.12	22.88	15-30
0.3	37.69	7.95	85.07	14.93	9-19
0.075	45.23	9.54	94.61	5.39	3-8

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Job No.: CTCE/BBMP/HRP/W.No.07/SDBC/AGG/2014-15 29.08.2014

Aggregate Gradation Test

IS : 2386 Part I

Client	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	**Mr. H.R. Pratap,** Contractor, Bangalore.
Name of the Work	Improvements to roads in BGS Layout in Ward No.07, Byatarayanapura, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-TEND/84/2014-15 Dated: 25.08.2014
Sample I / D	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete (SDBC)
Date of Testing	29.08.2014

Total Weight of Sample: 5380 gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
13.2	0	0.0	0	100	100	Gradation satisfies Grade-II MORTH specification
9.5	315	5.9	5.86	94.14	90-100	
4.75	2560	47.6	53.44	46.56	35-51	
2.36	847	15.7	69.18	30.82	24-39	
1.18	516	9.6	78.77	21.23	15-30	
0.3	493	9.2	87.94	12.06	9-19	
0.075	352	6.5	94.48	5.52	3-8	

Total Weight of Sample: 5290 gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
13.2	0	0.0	0	100	100	Gradation satisfies Grade-II MORTH specification
9.5	327	6.2	6.18	93.82	90-100	
4.75	2685	50.8	56.94	43.06	35-51	
2.36	742	14.0	70.96	29.04	24-39	
1.18	563	10.6	81.61	18.39	15-30	
0.3	321	6.1	87.67	12.33	9-19	
0.075	387	7.3	94.99	5.01	3-8	

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Job No.: CTCE/BBMP/HRP/W.No.07/SDBC/Stability/2014-15 29.08.2014

TEST REPORT ON STABILITY OF MIX

Client	:	**Asst. Executive Engineer**, Kodigehalli Sub Division, BBMP, Bangalore.
Agency	:	**Mr. H.R. Pratap,** Contractor, Bangalore.
Name of the work	:	Improvements to roads in BGS Layout in Ward No.07, Byatarayanapura, BBMP, Bangalore.
Reference	:	EE/BTP/BBMP/E-TEND/84/2014-15 Dated: 25.08.2014
Source of location	:	Hot mix Plant, Bangalore
Type of Mix	:	Semi Dense Bituminous Concrete
Date of Testing	:	29.08.2014

The results of the tests conducted on the bituminous mix sample are as follows:

Sl. No	Description	Test Result 1	Test Result 2	Requirement as per MORTH (Table 500-16)
1	Marshal Stability, at 60° C, Kn	10.20	10.30	8.2 Kn (min)
2	Marshal flow at 60° C, mm	2.50	2.60	2 – 4
3	Percent air voids	3.25	4.25	3 – 5
4	Percent voids in mineral aggregates (VMA %)	14.10	14.20	13 - 15
5	Percent voids filled with Bitumen (VFB %)	72.35	72.50	65 – 78
6	Density, g/cc	2.26	2.27	---

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